# Workshop on Probabilistic Flood Hazard Assessment

# Panel 6: Riverine Flooding

**Co-Chairs:**
**Rajiv Prasad, PNNL, and Will Thomas, Michael Baker**

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# Panel 6 Presentations

*Riverine PFHA for NRC Safety Reviews – Why and How?*...Rajiv Prasad, PNNL

*Flood Frequency of a Regulated River - the Missouri River*............................
..............................................................................Douglas Clemetson, USACE

*Extreme Floods and Rainfall-Runoff Modeling with the Stochastic Event Flood Model (SEFM)*.............................................Mel Schaefer, MGS Engineering

*Use of Stochastic Event Flood Model and Paleoflood Information to Develop Probabilistic Flood Hazard Assessment for Altus Dam,Oklahoma*.......................
.................................................................... Nicole Novembre, BoR

*Paleoflood Studies and their Application to Reclamation Dam Safety*...................
...................................................................... Ralph Klinger, BoR

# Panel 6 Panelists and Rapporteurs

- Panelists:
  - **Douglas Clemetson, USACE**
  - **John England, BoR**
  - **Nicole Novembre, BoR**
  - **Jery Stedinger, Cornell University**
  - **Mel Schaefer, MGS Engineering**

- Rapporteurs
  - **Peter Chaput, NRC (NRO)**
  - **Jeff Mitman, NRC (NRR)**

# Panel 6 Questions for Discussion

1. Runoff simulation-based approaches for riverine PFHA could use either event-based or continuous model simulations. What are the strengths and weaknesses of the two approaches? What R&D is needed to address weakness/gaps?

2. How can we best combine flood frequency analysis approaches (including historical paleoflood information) with simulation approaches to estimate magnitudes and frequencies for extreme flooding events? Is there additional R&D needed in this area?

3. A full-blown PFHA that includes both sensitivity analysis and uncertainty analysis may be very demanding in terms of computational resources (i.e. large numbers of simulations may be needed). What approaches are available to provide useful results while minimizing the number of simulations that need to be performed?

4. A full-blown PFHA will also be demanding in terms of workload for the analyst. What software tools are available to assist in streamlining the workflow? Is there a significant need for new/improved tools? If so, what is the most critical need?

5. What approaches are available for handling correlations in events/processes that combine to generate extreme riverine floods?

# Panel 6 Questions for Discussion

6.  In a full-blown PFHA using runoff simulation approach, probability distributions of hydrometeorologic inputs and model parameters are needed. What methods or approaches are available to estimate these probability distributions?

7.  Uncertainty in runoff simulations can arise because of uncertainties in inputs, model parameters, and the model structure. What methods or approaches are available to estimate these uncertainties?

8.  How do you validate a runoff model for extreme floods?

9.  How do you think non-stationarity (that has already occurred in the past, e.g., land-use changes and may occur in the future, e.g., global climate change) can be accounted for in a runoff simulation approach for PFHA?